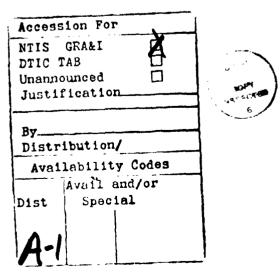
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# OFFICE OF NAVAL RESEARCH PUBLICATIONS / PATENTS / PRESENTATIONS / HONORS REPORT FOR 1 OCTOBER 1987 through 30 SEPTEMBER 1988

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R & T NO
TITLE OF CONTRACT: Symmetry Breaking Bifurcations and the Growth of Chaos in a Rotating Fluid
NAME OF PRINCIPAL INVESTIGATOR: Harry L. Swinney
NAME OF ORGANIZATION: The University of Texas at Austin
ADDRESS OF ORGANIZATION: Physics Department, Austin, TX 78712
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## PAPERS SUBMITTED TO REFEREED JOURNALS (Not yet published)

"Nonlinear standing waves in Couette-Taylor flow," R. Tagg, S. Edwards, H. L. Swinney, and P. S. Marcus, submitted to Phys. Rev. Lett. (1988).

"Laboratory model of a planetary eastward jet," J. Sommeria, S.D. Meyers, and H.L. Swinney, Nature, to appear.

"Divergence-free velocity fields in nonperiodic geometrics," L. Tuckerman, to appear in J. Computational Physics.

"Transformations of matrices into banded form", L. Tuckerman, to appear in J. Computational Physics.

"Steady-state solving via Stokes preconditioning: recursion relations for elliptic operators," L. S. Tuckerman, to appear in *Proc. of the Eleventh Int'l. Conference on Numerical Methods in Fluid Dynamics*, ed. by D. L. Dwoyer, M. Y. Hussaini, and R. G. Voigt (Springer-Verlag, Berlin, 1989).

"Traveling waves in axisymmetric convection: the role of sidewall conductivity," D. Barkley and L. S. Tuckerman, submitted to *Physica D* (1988).

#### PAPERS PUBLISHED IN REFEREED JOURNALS

"Primary instabilities and bicriticality in flow between counterrotating cylinders," W.F. Langford, M. Golubitsky, R. Tagg, E. Kostelich, and H.L. Swinney, Phys. Fluids 31, 776-785 (1988).

"Instabilities and chaos in rotating fluids," in *Nonlinear Evolution and Chaotic Phenomena*, ed. by G. Gallavotti and P. W. Zweifel (Plenum Publishing Co., 1988), p. 319-326.

"A laboratory simulation of the great red spot of Jupiter," J. Sommeria, S.D. Meyers, and H.L. Swinney, Nature 331, 689-693 (1988).

"Numerical simulation of Jupiter's Great Red Spot," P.S. Marcus, Nature 331, 693-696 (1988).

"Global bifurcation to traveling waves in axisymmetric convection," L. S. Tuckerman and D. Barkley, Phys. Rev. Lett. 61, 408-411 (1988).

#### PAPERS PUBLISHED IN NON-REFEREED JOURNALS

None

TECHNICAL REPORTS PUBLISHED

None

BOOKS (AND SECTIONS THEREOF) SUBMITTED FOR PUBLICATION

None

#### BOOKS (AND SECTIONS THEREOF) PUBLISHED

None

**PATENTS FILED** 

None

**PATENTS GRANTED** 

None

## INVITED PRESENTATIONS BY H.L. SWINNEY AT TOPICAL OR SCIENTIFIC/TECHNICAL SOCIETY CONFERENCES

10/2/87	Schlumberger (Austin), Seminar
10/9/-10/87	J. H. Taylor Symposium, Rhodes College, Memphis
10/21-23/87	Dynamic Patterns in Complex Systems, Bahia Mar, Florida
12/14/-15/87	Ed Lorenz Symposium, M.I.T.
2/24/88	Duke University, Physics Department Colloquium
4/13/88	Chaos Review Panel, Jason, Scripps Institute of Oceanography
4/20/88	American Physical Society Annual Meeting, Washington, D. C.
4/21/88	Clarkson University, Physics Colloquium
5/4-5/88	Department of Energy Symposium on Energy Engineering Sciences, Argonne
5/12/88	Rutgers Statistical Mechanics Meeting, Newark, NJ
5/16-20/88	Advances in Fluid Turbulence, Los Alamos, New Mexico
7/26-8/5/88	Enrico Fermi International School of Physics, Nonlinear Topics in Ocean Physics, Varenna, Italy (3 lecture course)
7/29/88	National Institute of Optics, Florence, Italy, Seminar
9/15/88	Texas A&M University, Physics Colloquium
9/21-22/88	Chemical Engineering Colloquium, Rice University, Houston, TX

## <u>CONTRIBUTED</u> PRESENTATIONS AT TOPICAL OR SCIENTIFIC/TECHNICAL SOCIETY CONFERENCES

11/23-25/87 "Stability of Flow Between Counter-Rotating Cylinders", Randall Tagg, Eric J. Kostelich, and Harry L. Swinney, Annual Meeting of the American Physical Society, Division of Fluid Dynamics

### OTHER RECENT PROFESSIONAL ACTIVITIES (H. L. Swinney.)

Director, The Center for Nonlinear Dynamics, University of Texas, 1985-Editor, <u>Physica D-Nonlinear Dynamics</u> (North-Holland Publishing Co., Amsterdam), 1982-1986

Member of the Executive Committee, Division of Fluid Dynamics, American Physical Society, 1983-86

Co-organizer, Fluid and Plasma Turbulence Conference, Austin, Dec. 7-11, 1987

Co-organizer, Dynamics Days Texas, Houston, January 5-8, 1988

Member of the Organizing Committee, Complex Systems Summer School, Santa Fe, June 13-July 18, 1988

Organizer of course entitled CHAOS — 7 lectures of 3 hours each held on 7 successive Fridays at The University of Texas Applied Research Laboratory, March 25-May 6, 1988

Organizing Committee, Year of Dynamics (1989-90), Institute of Mathematical Analysis, University of Minnesota

Member, Advisory Board for the Warwick Nonlineqar Systems Laboratory, 1986-

Member, Science Board of the Santa Fe Institute, 1987-

Member, External Advisory Board, Center for Interdisciplinary Complex Systems, University of Arizona, 1987-

#### GRADUATE STUDENTS SUPPORTED UNDER CONTRACT FOR YEAR ENDING 30 SEPTEMBER 1988

Bright Dornblaser William S. Edwards Andrew Fraser John Good Steve Meyers Michael Schatz

### POSTDOCTORALS SUPPORTED UNDER CONTRACT FOR YEAR ENDING 30 SEPTEMBER 1988

Eric Kostelich Randall Tagg Laurette Tuckerman